

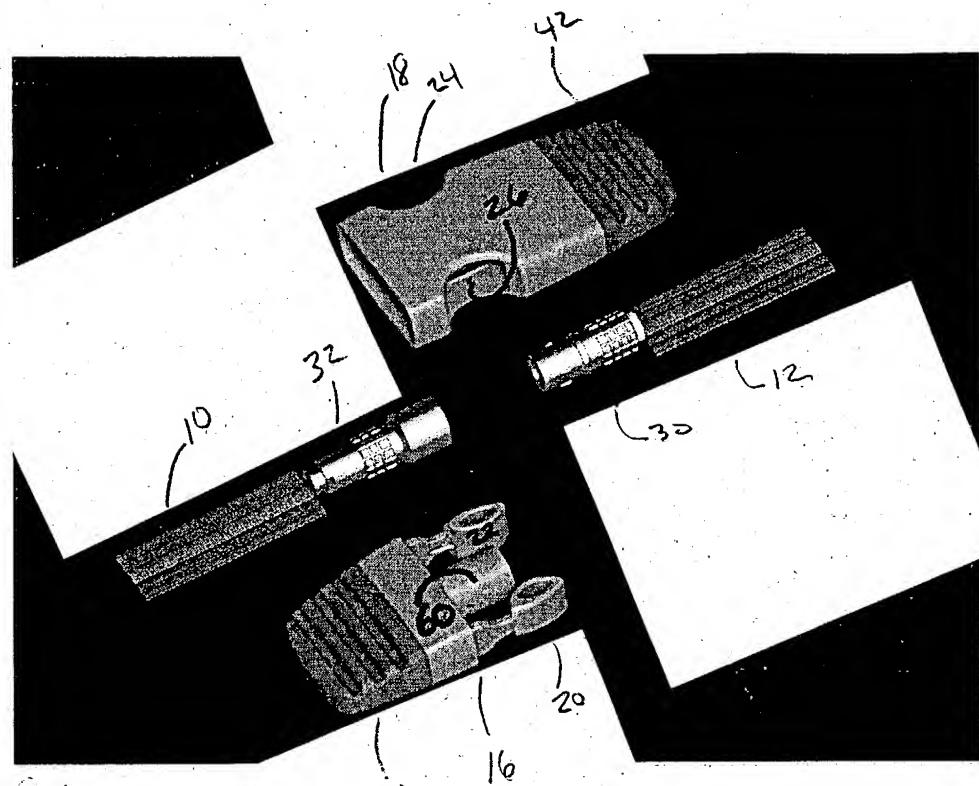
F5!

Figure 9: USB v1 Cable with Fastex Quick Disconnect Capability for Transmission across Boundaries. (This information is proprietary to Foster-Miller)

It quickly became apparent that while functional, USB connectors would not be sufficiently rugged for military field applications. After discussions with the Army and Plastics One it was determined that we would use the same 5-pin OF Lemo connector that was then being used on the Land Warrior 1.0 system. The OF Lemo connector was selected due to its small size and relatively high pin count as compared with the USB connector. When mated this connector has an environmental protection index of IP67 as per the IEC 529 standard. This rating indicates that the connection is dust tight and protected from temporary immersion. Our inspection of the OF Lemo revealed that much of the connector's bulk comes from its latching mechanism. Since the Fastex buckle connector takes up this functionality we proposed that this portion of the Lemo (Figure 10) could be removed. The stripped inner barrel of the OF Lemo is shown in Figure 11 next to a proposed buckle connector.

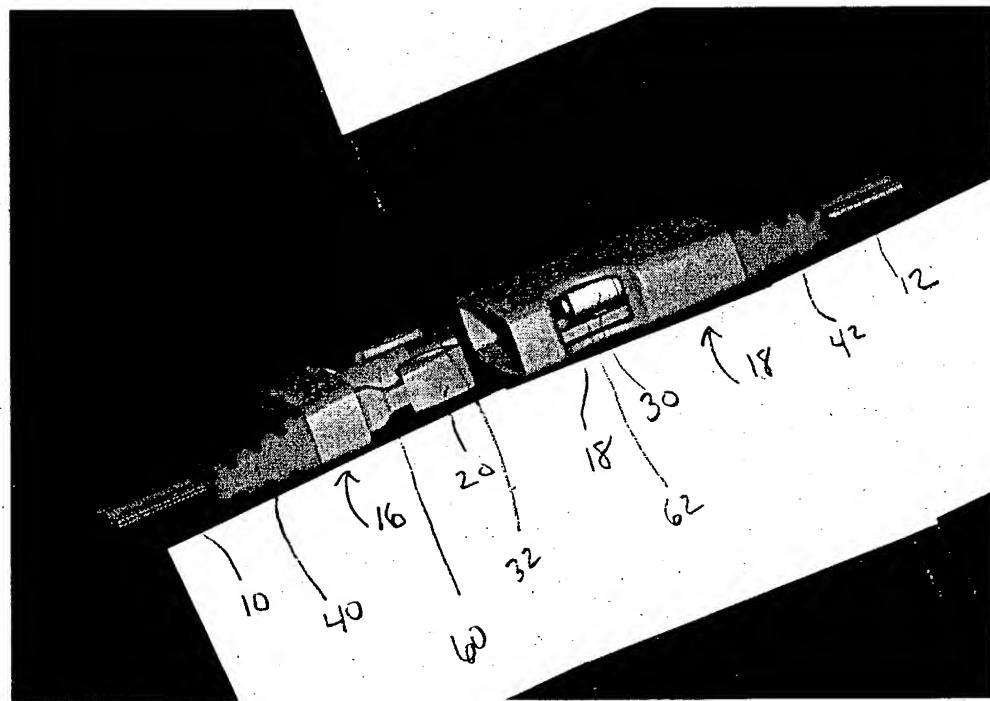
While the stripped down Lemo approach did reduce connector volume and transfer latching functionality to the buckle it also removed most of the connector's water resistance in the process. Another concern with the latching mechanism on the OF was that even if it were left intact to maintain its environmental protection it would still need to be overmolded. This procedure would immobilize or at least restrict the range of motion of the outer release sleeve of the latching mechanism, leading to an increase in the required pullout force of up to 33 lbs as apposed to the 1.8 lbs pounds encountered when the locking mechanism is disengaged. In practice however the required pullout force of the OF with restricted release sleeve may be much less than 33lbs. Pullout tests performed

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*Figure 22: Shortened Connector Overmolding. (This information is proprietary to Foster Miller)*

F/2



*Figure 23: Redesigned Connector. (This information is proprietary to Foster Miller)*

F/3

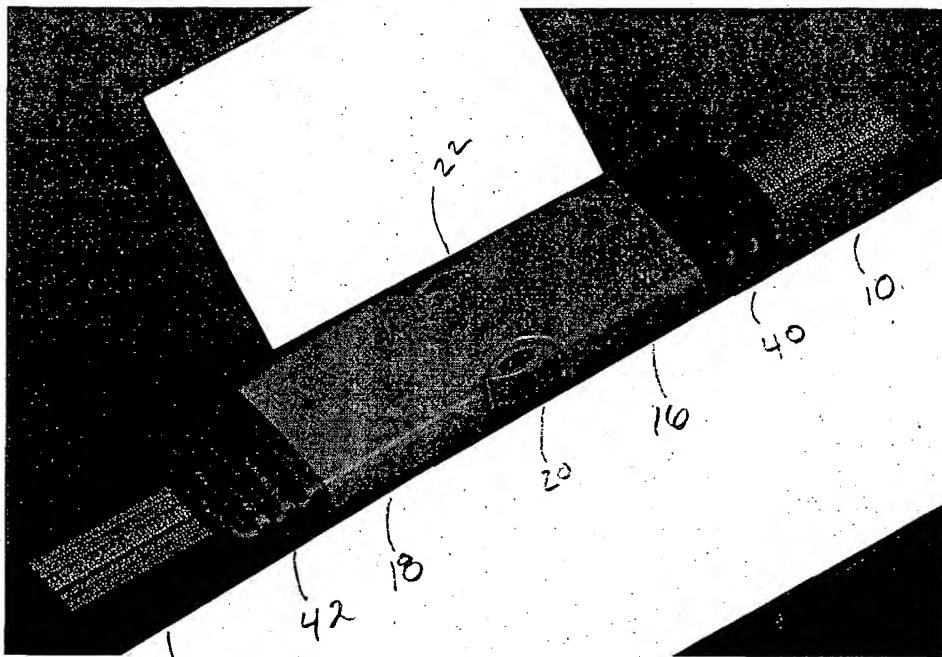
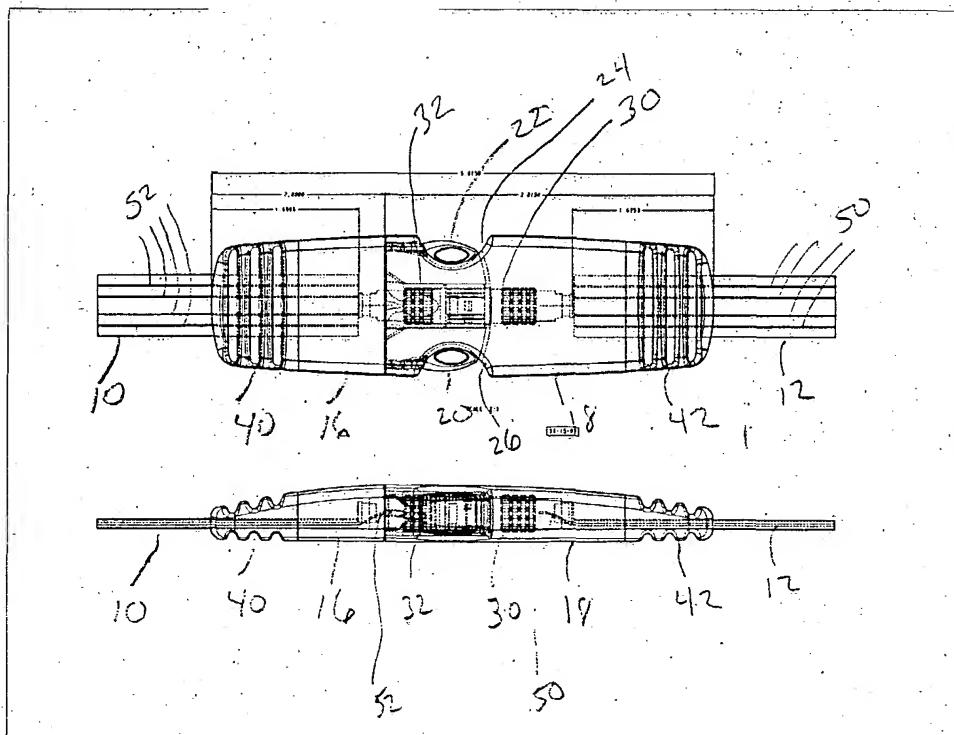


Fig. 4

Figure 18: First A  
25 Connector as a

0K Lemo Connector Using WSR-  
(This information is proprietary to Foster-Miller)



Figs

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Figure 19: Schematic of First Attempt at Enclosing 0K Lemo Connector Using  
WSR-25 Connector as a Baseline. (This information is proprietary to Foster-Miller)

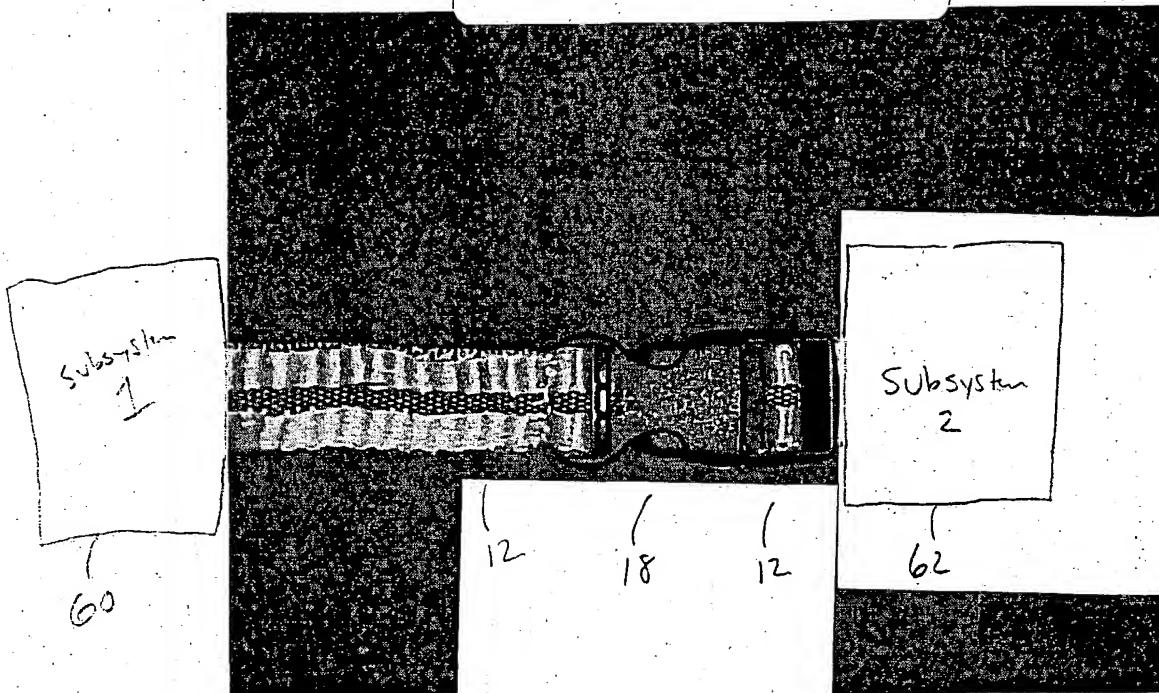


Figure 4: Top View of Buckle Concept for Power Transmission Using Loosely Woven Aracan Bus. (This information is proprietary to Foster-Miller)

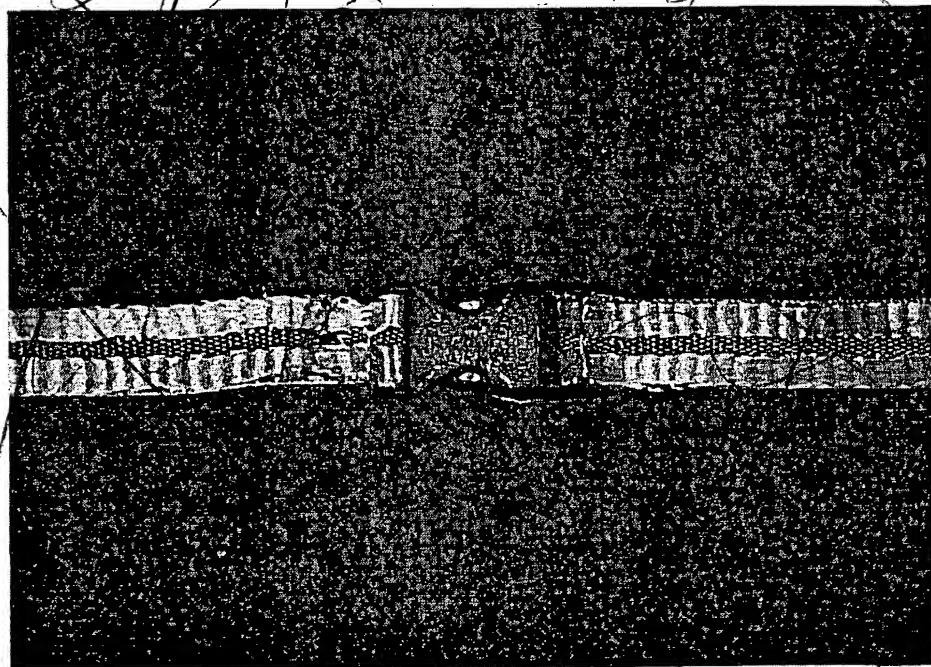
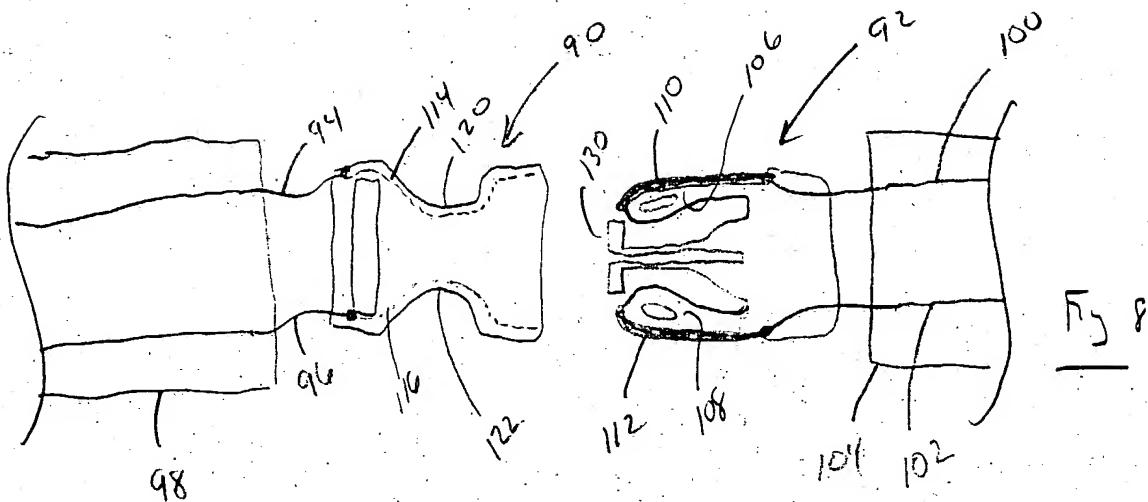


Figure 5: Bottom View of Buckle Concept for Power Transmission Using Loosely Woven Aracan Bus. (This information is proprietary to Foster-Miller)

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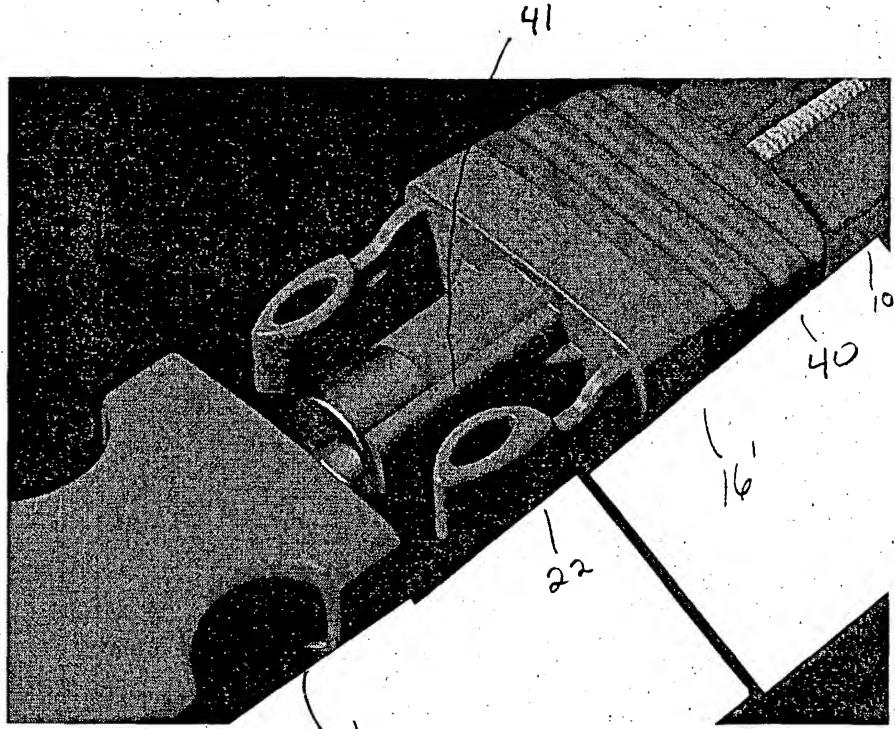


Figure 42: Improved Connector. (This is a variation of Figure 41, but the crimped contact is applied on Barrel of the Lemo connector.)

Fig 9A

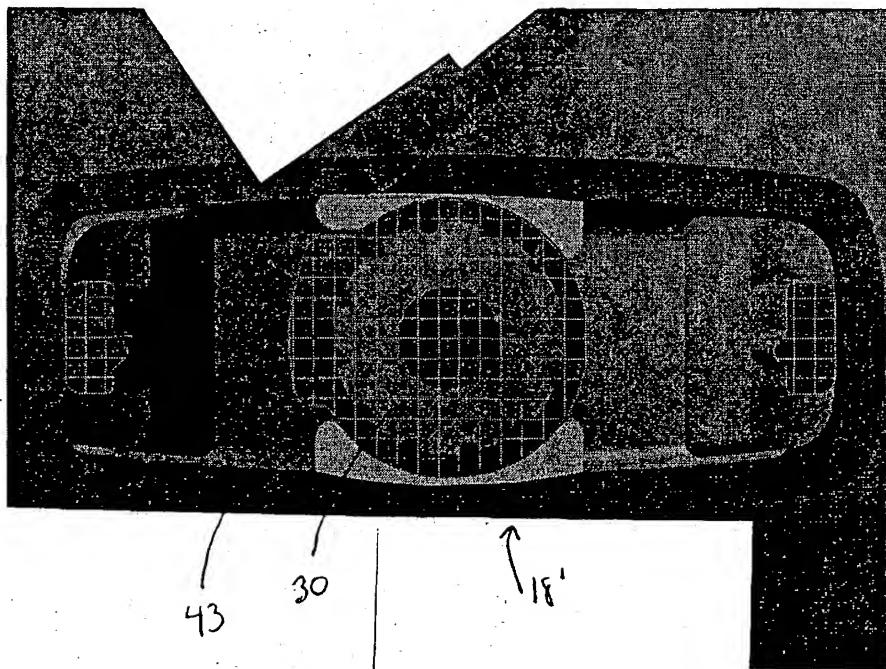
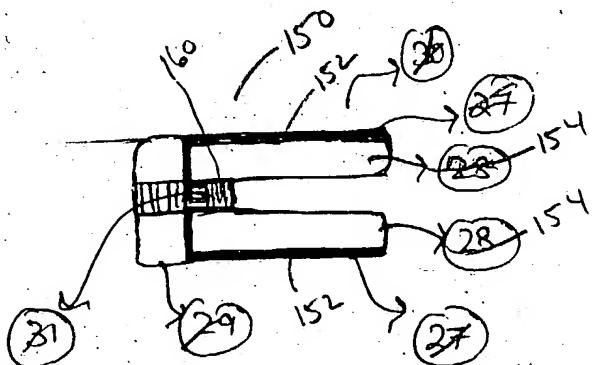


Fig 9B

Figure 43  
Proprietary

Information is

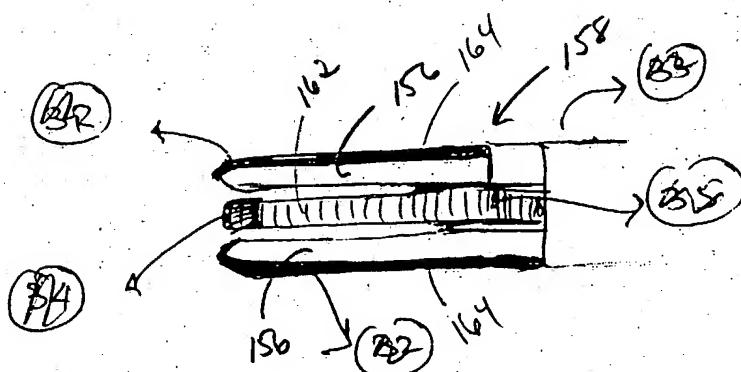
Figure 10 (a) Sliding Plastic Ductile Connector



female

Fig 10

figure 10



Male

Fig 11

Figure 11 Power Transfer (Male Assembly) Cable

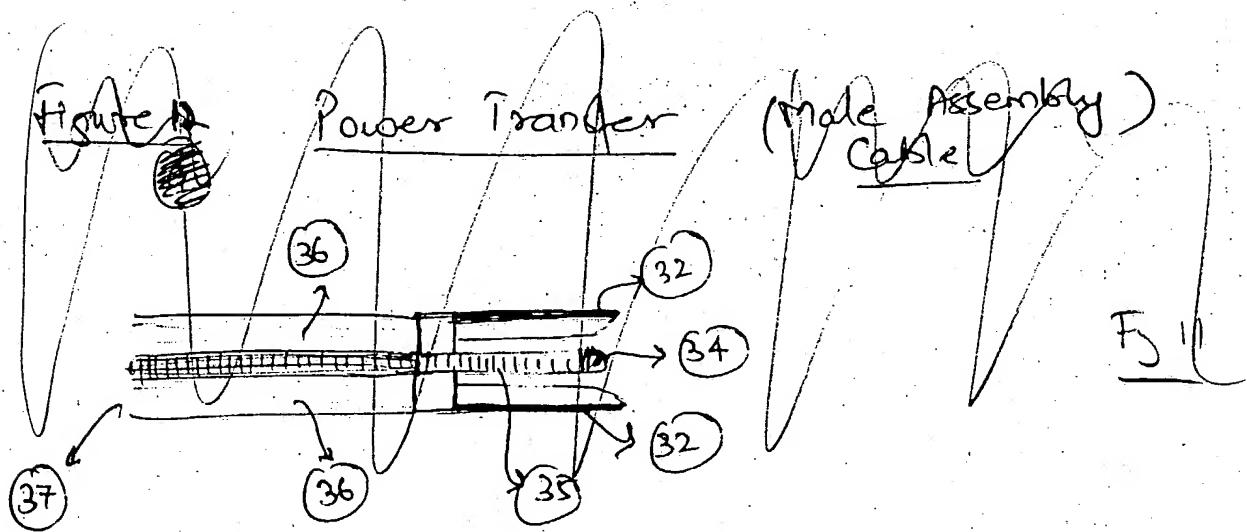
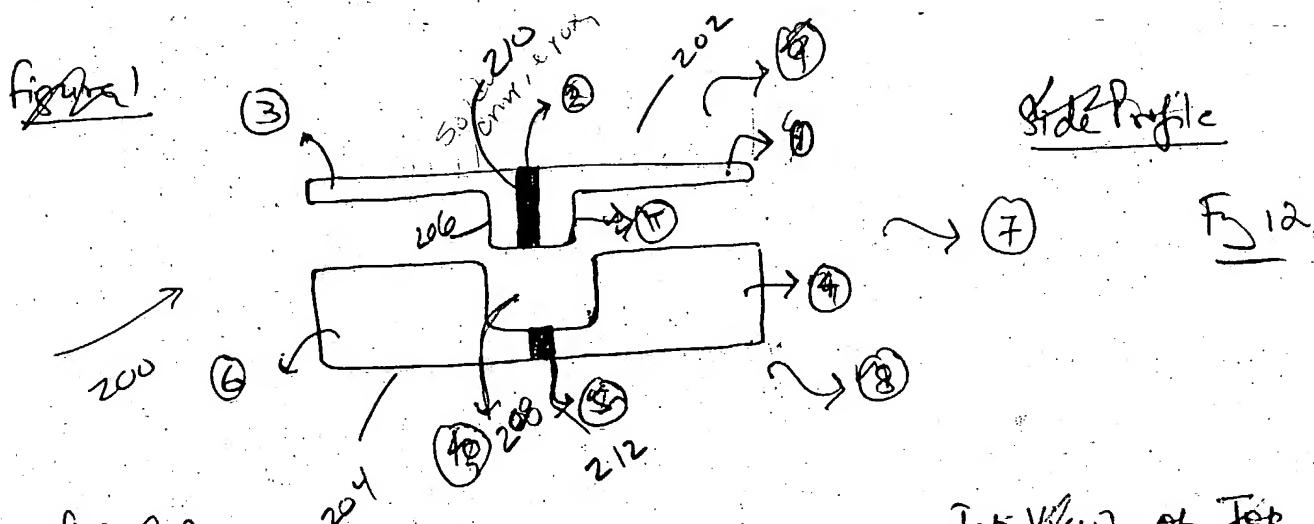
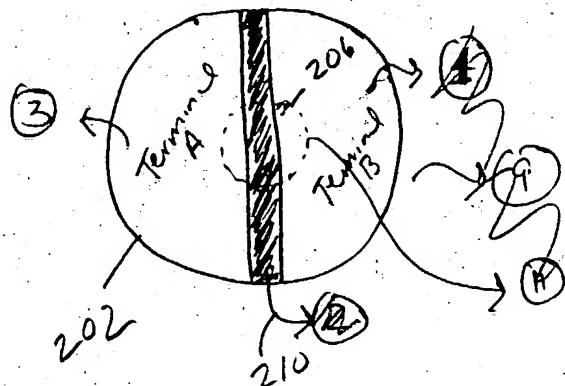


Fig 11

## Snap Connector for



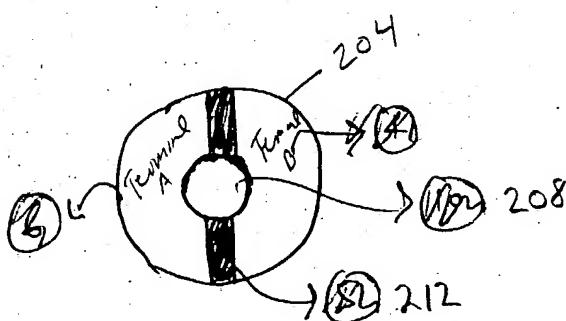
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Top view of top  
view

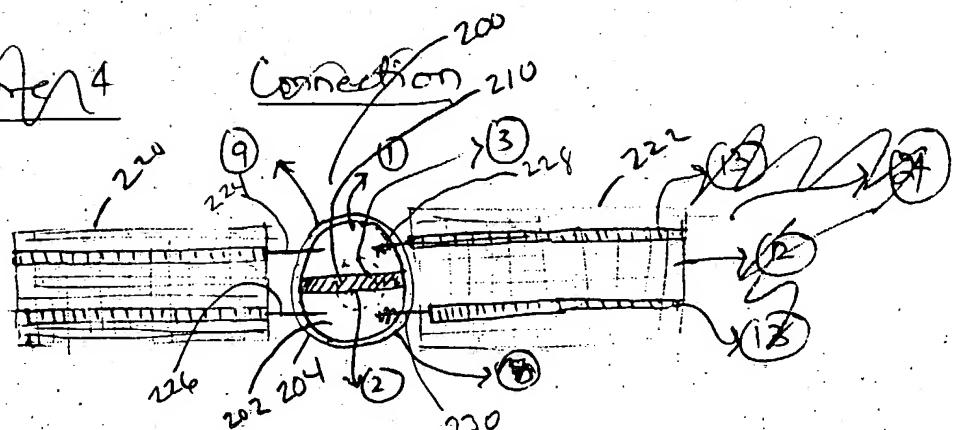
Fig. 13

Figure 3



14

figure 4



方 15

## Snap Connect

## er / Data Transfer

Figure 5

Top Part of Snap Connector (Ring)

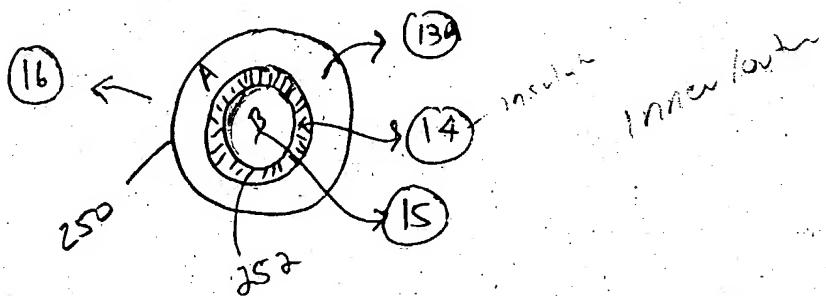


Figure 6 Side View of Top Ring

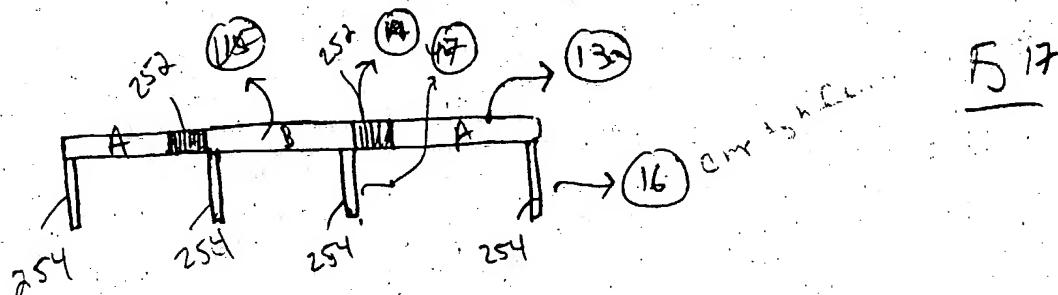


figure 7 Bottom Ring of Snap Connector (Bottom View)

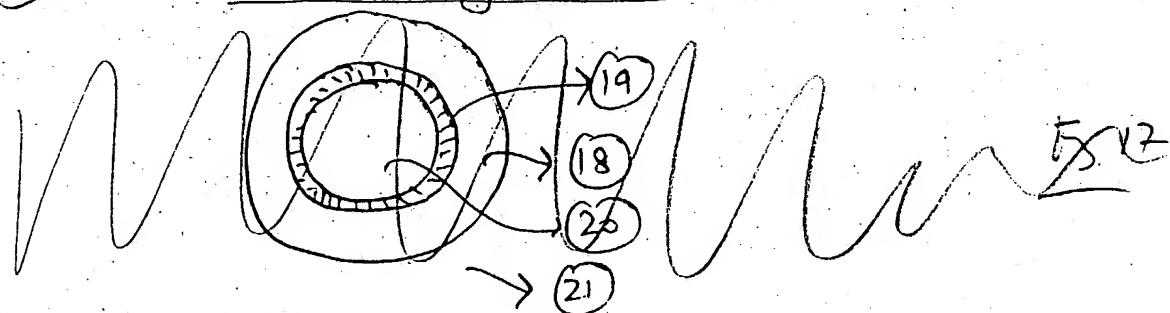


figure 8      Side View of Bottom Ring

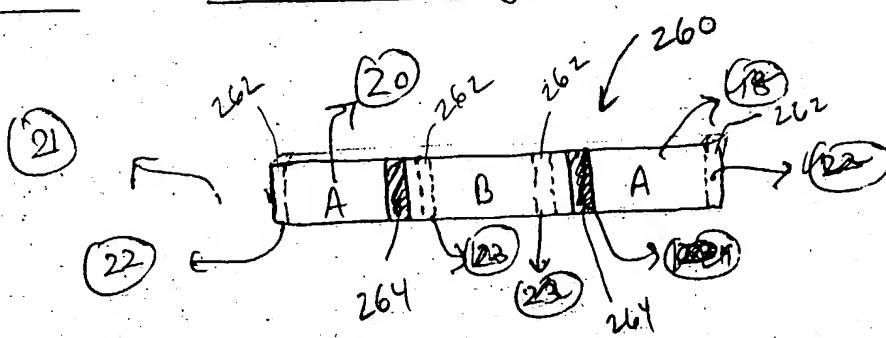
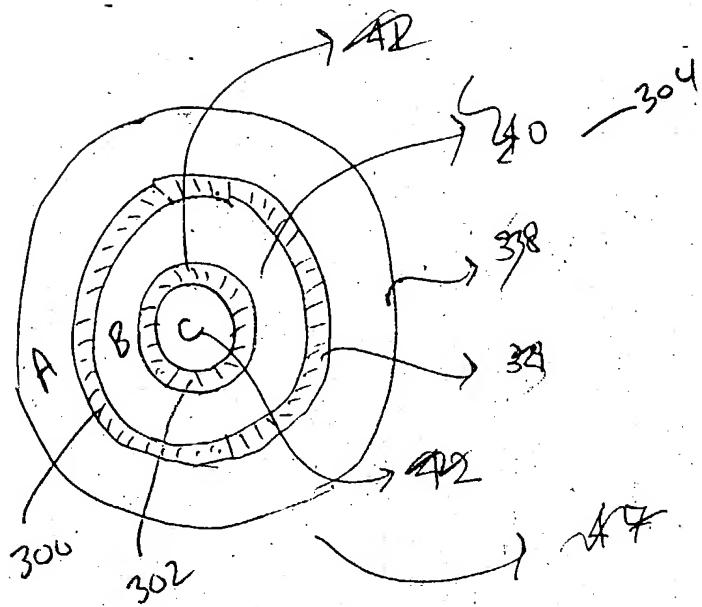
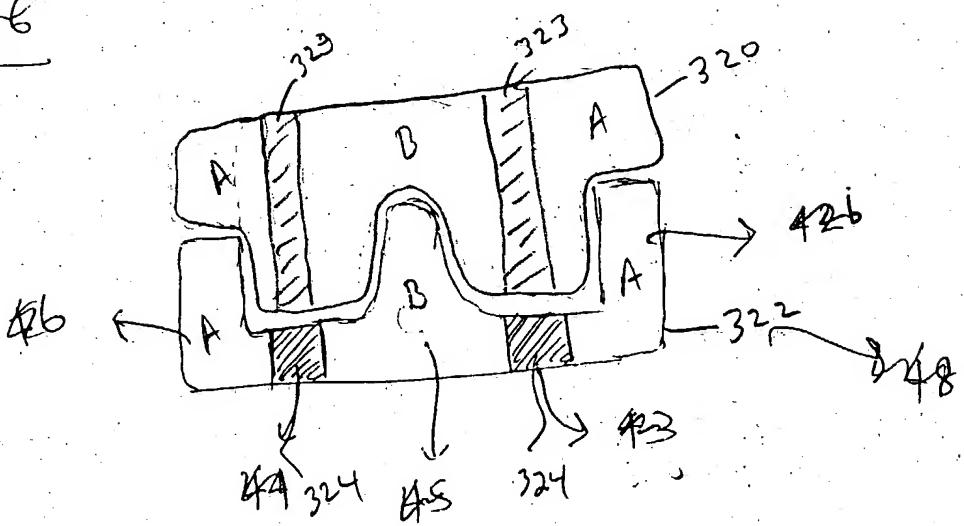


Figure 15



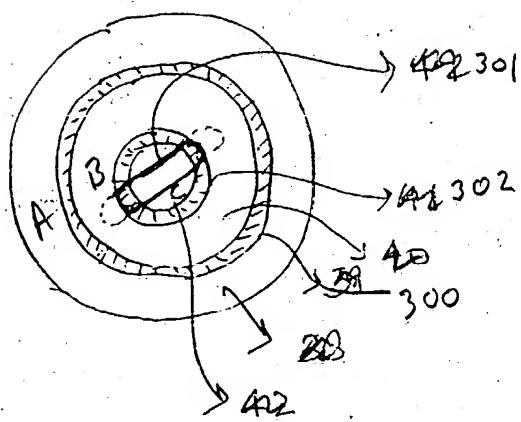
F 19

Figure 16



F 20

Figure 21A



F 21

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Fig 18

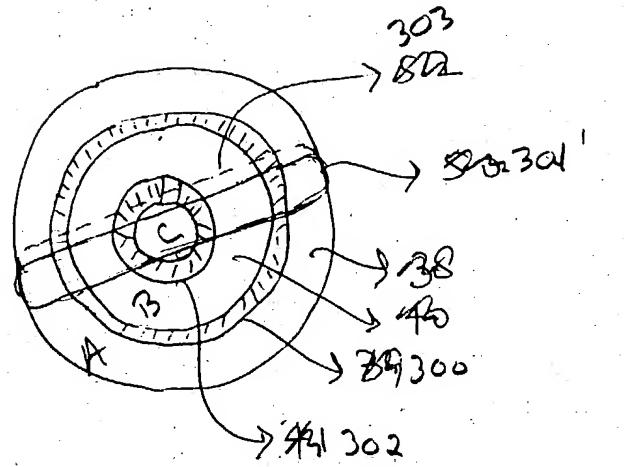
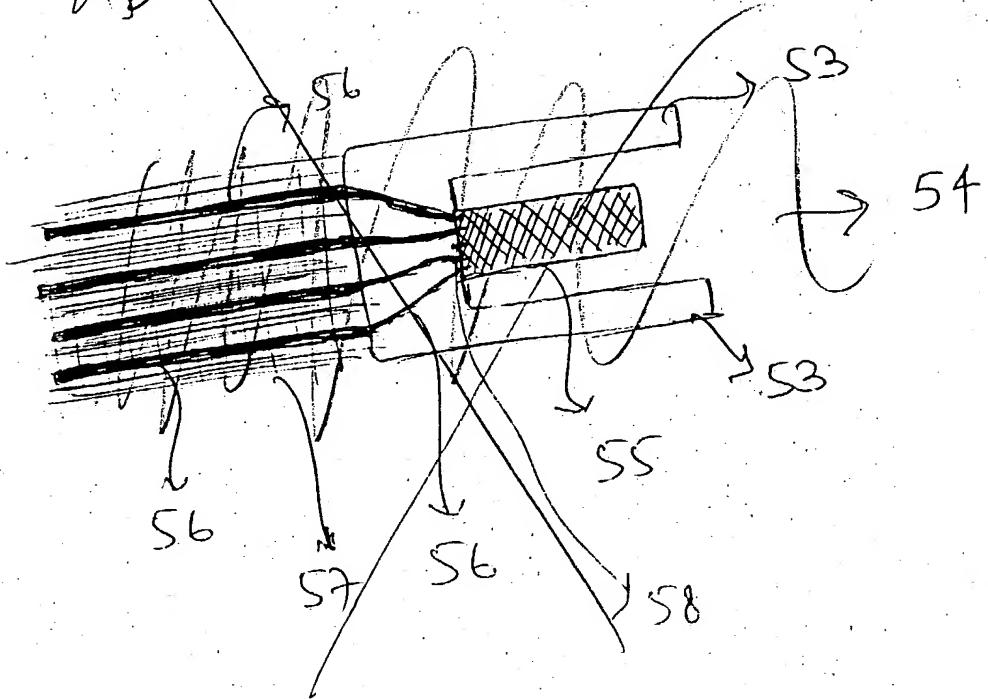
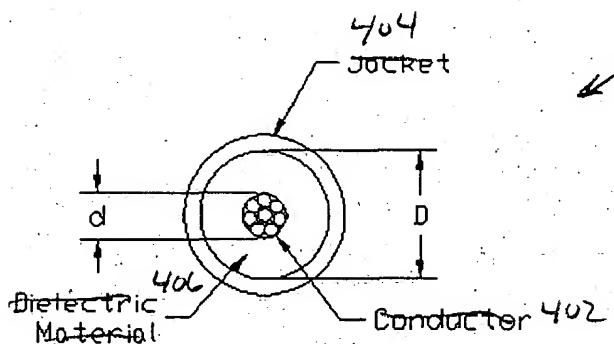


Fig 22

Figure 19



In an other embodiment, both connectors are designed to be impedance controlled (eg. for low-level signal or high frequency applications). In this embodiment, both the male and female connector has a center conductive pin/receptacle, and a conductive shell (jacket) separated by an insulating dielectric. The following formula can be used for calculating the characteristic impedance of a coaxial construction. (formula taken from Reference Data for Radio Engineers book published by Howard W. Sams & Co. 1975, page 24-21).



Characteristic Impedance ( $Z_0$ ):

$$Z_0 = \sqrt{\frac{138}{\epsilon}} \times \log_{10} \frac{D}{d} \text{ in ohms}$$

Where:

$d$  = outer diameter of inner (center) conductor (approximate value for stranded)

$D$  = outer diameter of dielectric

$\epsilon$  = dielectric constant ( $\epsilon=1$  for air)

This equation supports the fact that the characteristic impedance of a coax cable is directly related to the diameter of the conductor and the dielectric. For component video cables, this characteristic impedance should be 75-ohms. With characteristic impedance ( $Z_0$ ) held at a constant 75-ohms, the variables are the diameters and dielectric constant.